The Effect of Reward on Creative Performance: A Facilitative or Detrimental Effect Depends on Creative Potential

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May 2007

Acknowledgements

I would like to thank all the students who agreed to participate in this study, and their seminar-leaders who made it possible. I owe thanks to Benedicte Bjørnstad and Tormod Våge for helping me translate the tests employed in the study, and to Sturla Bentzen for rating the TTCT-tests. Finally I would like to extend a great thanks to my supervisors Frode Stenseng and Kjell I. Øvergård, and my co-supervisor Thomas Hoff, for invaluable help and guidance throughout the process.

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Abstract

Several researchers have investigated the effect of extrinsic motivators (e.g. rewards) on creative performance. The learned industriousness theory (e.g. Eisenbeger & Selbst, 1994) state that individuals learn to distinguish which dimensions of behavior are rewarded, and extend more effort to these dimensions when offered a reward. Accordingly, a reward offered for explicitly stated creative behavior should elicit more creative behavior. On the other hand, the intrinsic motivation principle of creativity (Amabile, 1996) state that intrinsic motivation is conducive to creative idea-generation. Being offered an extrinsic motivator for creative performance decreases this intrinsic motivation, and thus should have a detrimental effect on creativity. Amabile (1996) ground her theory on several studies suggesting that a mental state where thought is associative and attention is defocused, is conducive to creative idea-generation (e.g. Martindale, 1999). Amabile (1996) argue that such a mental state (creative potential) is more likely to be found in an intrinsically motivated state, compared to an extrinsically motivated state. The present study assessed whether or not creative potential is a variable mediating the effect of reward on creative performance: For individuals with high creative potential, reward may have a detrimental effect on subsequent creative performance, while for individuals with low creative potential reward may have a facilitative effect on creative performance. A regression analysis found support for this hypothesis. It is argued that the intrinsic motivation principle of creativity can account for the findings regarding the high-participants, while the learned industriousness theory can account for the findings regarding the low-participants.

1. Introduction

The ability to generate creative ideas is being increasingly valued in school-performance (Sternberg, 2003) and successful corporations (Kelley, 2004; Shalley & Gilson, 2004). Hence, the issue of whether different environmental factors have a facilitative or detrimental effect on creative performance has come into focus. A question that has drawn the attention of several researchers is that of whether creative performance can be "lured" with a reward, or whether it is best left to its own unpredictable timing. Behaviorally oriented theorists (e.g. Eisenberger & Selbst, 1994) argue, according to general behavior theory, that creative behavior can be facilitated by offering a reward. Cognitively oriented theorists (e.g. Amabile, 1996) on the other hand, argue that a reward will narrow the task-attention of the individual and thus constitute a detrimental effect on creative performance.

1.1 The learned industriousness theory on creative functioning

Eisenberger and colleagues (Eisenberger, Armeli & Pretz, 1998; Eisenberger, Haskins & Gambleton, 1999; Eisenberger & Rhoades, 2001; Eisenberger & Selbst, 1994) argue that individuals are inherently averted toward effort in general; including creative performance. However, this aversiveness can be modified by rewarding high effort: The "…sensation of high effort acquires secondary reward properties, and the aversiveness of high effort is thereby decreased" (Eisenberger & Selbst, 1994, p. 1118). Accordingly, the frequency of high effort should increase. This applies to both physical as well as cognitive effort. Following these lines of reasoning, the learned industriousness theory "…assumes that individuals learn which dimensions of performance are rewarded and generalize high or low effort more to these performance-dimensions than to other dimensions in subsequent tasks" (Eisenberger & Selbst, 1994, p. 1118). Hence, an individual performing a task, expecting to be rewarded for creative behavior (as opposed to conventional behavior), will put more effort into performing creatively. If information on preferred behavior (creative or conventional) is not conveyed, individuals will generalize from past experience on what kind of behavior is normally rewarded and act accordingly. It is also argued that normally conventional behavior is rewarded, and that individuals therefore will perform conventionally when offered a reward, if it is not explicitly stated that creative performance is preferred (Eisenberger & Selbst, 1994).

In summing up, Eisenberger and colleagues argue that to offer a reward for creative performance on a task, constitute a facilitative context for creative performance.

1.2 The intrinsic motivation principle of creativity

Several theorists (e.g. Mednick, 1962) argue that "…creative inspiration occurs in a mental state where attention is defocused, thought is associative, and a large number of mental representations are simultaneously activated" (Martindale, 1999, p. 149). Studies have also found support for these views (Ansburg & Hill, 2003; Kasof, 1997; Martindale, 1999; Suler, 1980). In this context, Amabile (1996) argue that such a creativity-facilitative mental state will be more typical of an intrinsically motivated individual compared to an extrinsically motivated individual. The intrinsically motivated individual will be more likely to take a heuristic task-approach, i.e. will be more attentive toward irrelevant environmental stimuli and willing to explore alternative pathways to solutions, compared to an extrinsically motivated individual, who will take a more algorithmic approach to solution.

Based on the abovementioned cognitive theories, as well as other theories (e.g. Chrutchfield, as cited in Amabile, 1996; MacGraw, 1978) and biographies of well-known creative individuals including Albert Einstein and the poet Sylvia Plath, Amabile (1996) formed an intrinsic motivation principle of creativity. This principle delineates the proposed relationship between creativity and different motivational states: "Intrinsic motivation is conducive to creativity; controlling extrinsic motivation is detrimental to creativity, but informational or enabling extrinsic motivation can be conducive, particularly if initial levels of intrinsic motivation is high" (Amabile, 1996, p. 119). In this context, reward is part of the more generic term extrinsic motivators. Thus a reward given as means of control (i.e. to make a person do something) will constitute a detrimental effect on creative performance. On the other hand, a reward with enabling or informational properties may be facilitative to creativity (Amabile, 1996).

1.3 Empirical findings supporting the learned industriousness theory

Investigations conducted by the behaviorism-oriented scientists operationalize creative performance as scores on divergent thinking-tests. Divergent thinking (DT) - defined as the ability to come up with several differing responses to an open-ended question - is considered

an important dimension of creative thinking (Eisenberger & Selbst, 1994). Eisenberger and Selbst (1994) performed a study where participants were divided into two groups, where they were either rewarded for divergent thinking (high DT-training) or for not thinking divergently (low DT-training). In the two conditions the participants were rewarded for making six new words, and one new word, respectively, using letters of the word "furniture" (e.g. "turn"). On a subsequent drawing-task, which consisted of making pictures using circles as the starting point, the results revealed that the drawings of the high-DT-participants were rated as more creative than the drawings of the low-DT-participants. In another study, Eisenberger et al. (1998) gave all participants high-DT-training, before they were divided into reward- and control-groups, and asked to do the same drawing-task as in the previous study (Eisenberger & Selbst, 1994). Results revealed that high-DT-training had a positive effect regarding creative performance on the drawing task when paired with promise of reward, as opposed to the condition where no reward was offered.

In further investigations, Eisenberger et al. (1999) either gave participants DT-training (reward or no reward), or rewarded convergent thinking-training (CT). Secondly, participants in the three conditions were either promised a reward (75 cents) or no reward on a drawing-task. The results showed that participants from the DT-training conditions (reward and no reward) showed increased creativity on the target-task when promised a reward, compared to when not promised a reward. Furthermore, the CT-training participants showed no difference between reward and no reward on the target-task. Eisenberger and colleagues conclude that the participants generalized the expectations of the task-administrator from the pre-condition (divergent or convergent thinking) to the target-task, so that DT-participants assumed that creative performance was expected on the target-task independently of whether or not the participants had been rewarded on the pre-task. However, CT-participants assumed that noncreative performance was expected on the target-task. Consequently, participants were motivated to perform according to their perceived expectations when promised a reward.

Eisenberger and Rhoades (2001) conducted two studies to replicate their findings. In these studies they used the consensual assessment technique as described by Amabile (1996) to assess creativity. They sought to assess the effect of rewarded and non-rewarded DT-training (and a control group) on creativity on a subsequent target-task. The two studies differed only on the target tasks employed. The results for both studies revealed that participants in the rewarded DT-training-condition were more creative compared to the non-rewarded DT-training-condition and the control group. Also, in a similar study, Eisenberger et al. (1998) paired three levels of task-instructions (they differed in the degree of explicitness with which

it was stated that creative responses were expected) with two levels of reward (reward or no reward). In line with previous findings, the results revealed that highly explicit instructions gave more creative responses when paired with reward than when not paired with reward.

To conclude on the behaviorism-oriented investigations on creativity and reward, when participants are offered a reward for performing creatively, they will perform more creatively compared to when not offered a reward.

1.4 Empirical findings supporting the intrinsic motivation principle of creativity

Cognitively oriented researchers have conducted several studies to investigate the effect of extrinsic motivators, e.g. reward, on the creativeness of task-performance. Hennessey and Amabile (as cited in Amabile, 1996) employed 1-5 grade pupils as participants in a study assessing the effect of reward on subsequent story-telling-creativity. The reward-participants were told that they would be allowed to take two pictures with a Polaroid camera if they promised to subsequently tell a story based on pictures in a picture-book. Control-participants were told that they were going to do two tasks, 1) first take two pictures with the camera, and 2) tell a story based on the book. The results revealed that the control-participants told stories that were considered more creative compared to the reward-participants, and it was concluded that "…the perception of a task as the means to an end is crucial to creativity decrements in task engagement" (Amabile, 1996, p. 164).

Amabile, Goldberg and Capotosto (as cited in Amabile, 1996) conducted a study where two levels of reward ($ 2 or nothing) were crossed with two levels of choice (participants either chose or were obliged to participate), in order to assess the effect on subsequent creativity in collage-making. Participants who chose to participate for a reward produced collages that were considered less creative, compared to participants who chose to participate without a reward, as well as participants who were obliged to participate but were not offered a reward. Obliged participants who were offered a reward produced more creative collages than participants from the other conditions. This latter result was attributed to positive affect; The reward might have been considered a bonus by the participants, since it was not related to their actual participation.

Joussemet and Koestner (1999) designed a study where a reward was promised for performing a DT-task (to come up with themes for a gala). The creativeness of the responses on the gala-task and on a subsequent drawing-task (the same as Eisenberger, 1994) was rated. Results revealed that participants who had been given a reward for doing the gala-task,

performed less creatively on the drawing-task, compared to those not offered a reward on the gala-task.

Hennessey (1989) designed a study in which children (7 to 13 years) were asked to make a geometric design on a computer. The older children (9-13 years) were in addition asked to write a cinquain poem, to control for age-effects. The participants were either promised a computer-administered reward or no mention of reward was made. The results revealed that reward had a detrimental effect on creativity when only the 10-13 year old participants were analysed.

In a non-experimental study by Amabile, Phillips and Collins (as cited in Amabile, 1996) professional artists were asked to randomly choose and submit 10 commissioned and 10 noncommissioned art-works for evaluation by art-experts. On average the experts rated the non-commissioned art-works to be more creative than the commissioned art-works. Also, a questionnaire concerning the conditions under which each art-work was done, showed a negative correlation between the creativeness of the art-work as judged by the experts, "…and the degree to which the artist reported feeling constrained by the commission" (Amabile, 1996, p. 175).

Amabile (1985) revealed that poets that were intrinsically oriented (had been told to focus on intrinsic motives for writing poetry) subsequently wrote haiku-poems that were considered more creative than the poems of extrinsically oriented poets.

The cognitively oriented studies investigating the effect of reward on creative behavior conclude that rewards offered for the completion of a task have a detrimental effect on creative performance.

1.5 Methodological divergence

The reason for the diametrically different findings in the behaviorism-oriented and the cognitively oriented studies is mostly attributable to the different theoretical backgrounds. Based on the learned industriousness theory, Eisenberger and colleagues (e.g. Eisenberger & Selbst, 1994) argue that the participants must either be taught (through DT-training) or told explicitly, what kind of behavior is expected of them for a reward. If such information is not conveyed, the participant will generalize from past experience that normally it is conventional behavior that is rewarded, and will thus perform less creatively when rewarded, compared to when not rewarded (Eisenberger et al., 1998).

On the other hand, Amabile and colleagues (e.g. Collins & Amabile, 1999) argue that tasks used to measure creativity ought to be open-ended, i.e. heuristic, as opposed to straightforward algorithmic tasks. When a participant is given explicit information on how to succeed on the task (either through DT-training or explicit instructions that creative responses are rewarded), the task can to a greater extent be solved by applying an algorithmic approach. In other words, what is considered a precondition within one tradition is considered a confounding variable within the other tradition (Eisenberg & Shanock, 2003).

1.6 Interaction-effect of creative potential and reward on creative performance

Several studies have shown that the effect of extrinsic motivators on creativity often depend on mediating factors, e.g. skill-level (Conti & Amabile, as cited in Amabile, 1996), choice (Amabile, Goldberg & Capotosto, as cited in Amabile, 1996), age (Joussemet & Koestner, 1999), task- or performance-contingent reward (Harackiewicz, 1979), and enabling or constraining commission (Amabile et al., 1994). Another possible mediating factor will be introduced in the following section.

Following the cognitively oriented theories of creative idea-generation (see Martindale, 1999), the thought-processes and the attention of individuals are *more or less* associative and defocused respectively, implying that they are *continuous* variables. The theories state that individuals whose thought-processes are more associative, and whose attention is to a larger degree defocused (creativity-conducive mental state), will be more creative than an individual in a less creativity-conducive mental state. Following Amabile's (1996) argument that controlling extrinsic motivators will narrow the attention of an individual, and thus decrease his creative potential, an individual with a highly defocused attention should experience a more decremental effect on creative performance of such an extrinsic motivator, compared to an individual with a less defocused attention. Thus, an interaction-effect between creative potential (creativity-conducive mental state) and controlling extrinsic motivators on creative performance might be expected, where the effect becomes less detrimental, as the creative ability of the individual decreases.

In fact, it might be expected that, as the mental state of an individual becomes sufficiently "un-creative", the effect of reward on creative performance may become facilitative. It might be argued that individuals who are not motivated (neither intrinsically nor extrinsically) to do a task, will perform at a minimum, and that if they are offered a reward for

performing the same task, they might then bother to extend a minimal effort onto the task, and as an effect perform more creatively.

1.7 The present study

Regarding the methodological divergence between the two theoretical positions, it might be possible to avoid the criticism from both camps. In the present study, by assessing creativity using the "JUST SUPPOSE" tasks from the Torrance Test of Creative Thinking test-battery (TTCT) (Scholastic Testing Service, Inc., 1990), criticism from both positions might be avoided. These are tasks in which the participant is offered an improbable situation (e.g. *clouds had strings attached to them which hang down to earth*) and is asked to imagine ("use your imagination") what would be the consequences. The explicit information given on preferred type of performance (e.g. creative or conventional) is minimal, but since the improbable situation is of such a character that it can not have been encountered by the participants in advance, they can not give conventional answers and at the same time actually solve the task. Kaufmann (2006) argue that situations in which the novelty of the task is high, implicate the search for a novel solution. Therefore, this type of task might be said to be a compromise between the information demand of the behaviorism-oriented theorists and the minimal information demand of the cognitively oriented theorists.

In addition, instead of comparing means from the reward-group with that of the control-group to assess which group scored higher on the TTCT, a questionnaire could ask the reward-participants to what degree they found the proposed reward attractive. Since it is likely that the participants will differ in the degree to which they find the reward attractive, such a measure will allow the experimenter to assess whether or not different degrees of reward-attractiveness will reveal different effects (facilitative or detrimental) on creativity. This might be done by performing a regression analysis.

In the present study, it was hypothesized that reward would have a detrimental effect on subsequent creativity among participants with a high creative potential, whereas participants low on creative potential would experience a facilitative effect of reward on subsequent creativity. Employing an experimental pre-post-test design, with creativity-tasks as pre- and post-tests and a reward being promised prior to the post-test for "good" performance on the post-test, it was expected that participants scoring high on the pre-test would experience a negative effect of the reward being offered for "good" performance on the

post-test, while participants scoring low on the pre-test would experience a positive effect of the reward being offered for "good" performance on the post-test.

2. Method

2.1 Participants

Participants constituted 155 students at the University of Oslo. 116 were in the experiment-condition, with a mean age of 23.82 (SD = 5.97) (83 females, and 33 males). 38 participants were in the control-condition, with a mean age of 23.32 (SD = 4.69) (26 females and 12 males). All participants were first-year psychology students, recruited from seminar groups they attended. 6 participants from the experiment-group were excluded from the regression-analysis due to missing variables.

2.2 Procedures

The experiment was conducted in relation to seminar groups. The groups consisted of between four to fifteen students. The different groups were in advance randomly assigned to either the experiment- or the control-condition.

A test-battery containing form A and B of Verbal activity 7 from the TTCT-inventory (see section 2.4), and three questions regarding the manipulation (see section 2.3) was handed out to the participants. The three questions regarding the manipulation were not present in the test-battery given to the groups in the control-condition.

The participants were asked to read and follow the instructions of form A of the Verbal activity 7 of the TTCT. After five minutes the participants were asked to stop writing. Subsequently the participants in the experiment-condition were presented with the manipulation, and then asked to read and follow the instructions of form B of the Verbal activity 7 of the TTCT. The participants in the control-condition were asked to go directly to form B of the Verbal activity 7 of the TTCT, without the manipulation being presented. After five minutes the participants were asked to stop writing. The experiment-group-participants were finally asked to fill out the three questions regarding the manipulation.

After the participants had finished the test-battery they were briefed about the nature of the experiment. This included information on the reward, which would not be given to the

five best perfomers on the tests, but to five random participants. They were asked to put their e-mail-address on a list in order to be able to receive the reward presented in the experiment. In conclusion, the participants were thanked and dismissed.

2.3 Manipulation

The manipulation consisted of the following message presented by the experimenter: "Now you will do a task similar to the one you just did. The last one was just a warm-up-task, so this is the one that counts. It is important that you focus and give your best, in order for us to get as accurate a measure of your full potential as possible. As a reward the five best participants in this survey will be awarded one gift-certificate each from Platekompaniet (a record shop). Now you can start."

2.4 Torrance Tests of Creative Thinking – Verbal, Activity 7, form A and B

The Torrance Tests of Creative Thinking (TTCT) (Scholastic Testing Service, Inc., 1990) was introduced by Torrance in 1966 and has been revised several times until today. Although the tests are sometimes referred to as tests of creativity (e.g. Ebrahim, 2006), they are more often referred to as tests of divergent thinking, which is considered an important constituent of creativity, in addition to conative-affective and environmental factors (Mouchiroud & Lubart, 2001). On this ground the TTCT has by some been criticized, and claimed to be an inadequate measure of "creativity" (e.g. Amabile, 1996). Nevertheless, several studies have in fact confirmed the predictive validity of the TTCT on predicting creativity (e.g. Cramond, Matthews-Morgan, Bandalos & Zuo, 2005; Kim, 2006; Mouchiroud & Lubart, 2001; Plucker, 1999; Torrance & Wu, 1981), as well as its positive correlation with other measures of creativity (Carson, Peterson & Higgins, 2005). On this ground, divergent thinking tasks from the TTCT were employed as measures of creativity.

The TTCT battery consists of five verbal and three figural activities. All of these activities come in two parallel forms, A and B. The activities have remained the same for many years (with the exception of verbal activity 6 having been removed from the battery), but the scoring-procedures for the activities have changed several times. The current scoring procedures for the verbal activities consist of three divergent thinking-factors: a) Fluency (The total number of different responses); b) Flexibility (The number of changes or shifts in

attitude or focus among the responses); c) Originality (The rarity of the responses) (Scholastic Testing Service, Inc., 1990).

The present study employed verbal activity 7 "JUST SUPPOSE", forms A and B, to measure divergent thinking. Form A (Appendix I) presents an improbable situation which the participant is asked to accept as given. The situation is as follows: "JUST SUPPOSE *a great fog were to fall over the earth and all we could see of people would be their feet.* What would happen? How would this change life on earth? List your ideas and guesses on the next page." A picture illustrating the situation accompanies the text. Following the instructions are two lined pages on which the participants are to write down their responses. Form B (Appendix I) is similar to form A with the only difference being the improbable situation and the illustration following the text. The situation presented on form B is as follows: "JUST SUPPOSE *clouds had strings attached to them which hang down to earth*. What would happen? List your ideas and guesses on the next page." Form A was employed as a pre-test of divergent thinking before the manipulation was introduced. Form B was employed as post-test.

Each test was given a score on each of the three divergent thinking-categories (fluency, flexibility and originality). The raw-scores were then standardized, and a composite divergent-thinking-score was made for each test by summing these standardized category-scores. This procedure was done by three independent raters, who were blind as to which of the two conditions the participants were in. A total divergent thinking-score (TDT) was computed for each participant on their pre-test and on their post-test, by summing up the composite scores from each rater. In addition, the TDT-scores over the pre- and post-tests were also standardized, with the purpose of using them in a regression-analysis.

2.5 Reward-attractiveness

Three items assessed the degree to which the reward offered in the manipulation was attractive to the participants. The three items were: 1) "To what degree do you find the reward attractive?" (*To a very little degree – to a very large degree*); 2) "How happy would you become if this reward was given to you on your birthday?" (*Not happy – very happy*); 3) "How much do you want the reward?" (*To a very little degree – to a very large degree*). Responses were measured on a 7-point Likert-scale (see appendix II).

3. Results

3.1 Descriptive statistics over the TTCT-scores

The mean of the three raters on the divergent thinking-categories is presented along with standard deviations in table 1.

On the standardized pre-TDT, the experiment-participants had a mean of -0.32 (SD = 7.02). The control-participants had a mean of 0.998 (SD = 7.20). On the post-test TDT the experiment-participants had a mean of -0.47 (SD = 7.68), and the control-participants had a mean of 1.63 (SD = 7.53). (The difference between experiment- and control-group mean did not add up to zero on neither the pre-test nor the post-test, due to the different N in the experiment- and control-groups.)

The normality-assumption of distributions of DT-scores has sometimes been found to be violated (Plucker, 1999). Values for skewness and kurtosis were assessed for the distributions of the rater-composite scores. The values for both kurtosis (ranged between -0.05 and 0.57) and skewness (ranged between 0.37 and 0.64) were small (Christophersen, 2006).

Table 1
Mean and Standard deviation on TTCT-category scores

		Pre-test: Mean (SD)	Post-test Mean (SD)
Experiment	Fluency	5.14 (1.66)	5.88 (1.87)
	Flexibility	2.18 (1.13)	2.76 (1.36)
	Originality	3.25 (1.25)	4.30 (1.59)
Control	Fluency	5.45 (1.58)	6.47 (1.85)
	Flexibility	2.11 (1.16)	3.06 (1.36)
	Originality	3.74 (1.38)	4.69 (1.62)

3.2 Cronbach's alpha over the raters

As a measure of the intra-class correlation between the three raters on the different divergent-thinking-categories (fluency, flexibility and originality), Cronbach alphas were computed for these categories on both pre- and post-test (see table 2). The TDT-scores were used in the further analysis.

Table 2
Cronbach alphas for the DT- category scores

Categories	Pre-test:	Post-test
Fluency	.89	.92
Flexibility	.85	.89
Originality	.83	.88

3.3 Main-effect of reward on TDT-score

According to the intrinsic motivation principle of creativity, a negative main-effect of reward on post-test-divergent thinking was expected, while according to the learned industriousness theory a positive effect was expected. An independent samples t-test was carried out, using post-TDT as test-variable, and group (experiment and control) as grouping variable. These results showed that the experiment-group (M = -0.47, SD = 7.68) did not score significantly different from the control-group (M = 1.63, SD = 7.53), t (2,146) = 1.46, p = .15 (2-tailed). This result confirmed neither the intrinsic motivation principle of creativity nor the learned industriousness theory.

3.4 Reward-attractiveness (R-A)

The mean and standard deviation of the three items were as follows: Item 1: (M = 4.64, SD = 1.56); Item 2: (M = 5.17, SD = 1.37); Item 3: (M = 4.49, SD = 1.59). A semi-confirmatory factor-analysis was performed to assess whether the three items tapped the same latent factor, “Reward-attractiveness”. Following Kaiser’s criteria, an initial factor analysis yielded one factor with eigenvalue greater than 1. The one factor explained 62.06 % of the variance in the three initial items. Cronbach’s alpha over the three items was .81. Based on the results of the factor-analysis and Cronbach’s alpha, it was concluded that the three items tapped one latent factor. The latent factor was labeled Reward-attractiveness (R-A), and was computed by summing the three item-scores and dividing by three (M = 4.77, SD = 1.29). The R-A was used in the further data-analysis.

3.5 Regression analysis of the variables

It might be argued that the R-A-score is a more direct measure of the degree to which a participant is extrinsically motivated, rather than whether or not the participant is in an experiment- or control-group. In order to test the main-effect of R-A on post-TDT, and in order to test the hypothesis that the effect of reward on creativity is dependent on the individual's initial level of creative ability, a multiple regression analysis was performed. Standardized scores were employed (the interaction-variable was not standardized, but computed by using standardized variables). Post-TDT was employed as dependent variable, pre-TDT, R-A, and an interaction-variable consisting of the cross-product of pre-TDT and R-A, was employed as independent variables.

R-A had no effect (b = -0.007, t (105) = -0.09, p = .93). Pre-TDT had a significant positive effect on post-TDT (b = 0.55, t (105) = 6.77, p = .00). A significant negative interaction between pre-TDT and R-A on post-TDT was found, at the .10-level of significance (b = -0.17, t (105) = -1.93, p = .057). The interaction-variable was further analyzed. The results are presented in table 3.

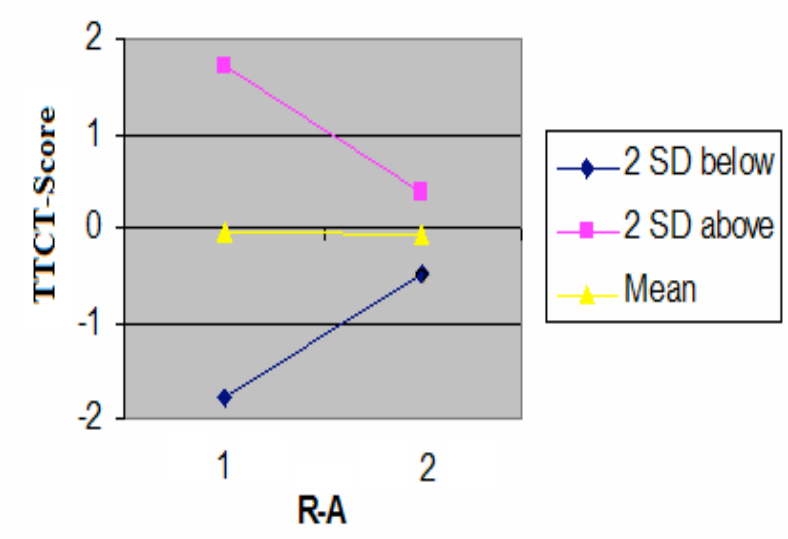
Table 3
Results of multiple regression analysis and simple slopes analysis

	b	*t*-value	Sig.
R-A	-0.007	-0.09	.93
Pre-TDT	0.55	6.78	< .000
Interaction	-0.17	-1.93	.057
2 SD above mean	-0.33	-1.73	.087
2 SD below mean	0.32	1.77	.080
At mean	-0.007	-0.09	.93

In order to avoid regression toward the mean effects, simple slopes analyses were conducted to investigate the interaction-effect further (Cohen, Cohen, West & Aiken, 2003). It was found that when pre-TDT was high (2 SD above the mean) a negative relation between post-TDT and R-A was significant at the .10-level of significance (b = -.33, t (105) = -1.73, p = .087). When pre-TDT was low (2 SD below the mean) a positive relationship between post-TDT and R-A was significant at the .10-level of significance (b = .32, t (105) = 1.77, p = .08). When pre-TDT was at the mean there was no significant relationship (b = -.007, t (105) = -.09, p = .93) between R-A and post-TDT. (See figure 1 and table 3)

Figure 1

The results of the simple slopes analyses



In summing up, the results of the regression analysis revealed that the effect of reward on post-TDT (creative performance) differed depending on the pre-TDT-score (creative potential) of the participants; Participants scoring high on pre-TDT experienced a detrimental effect of reward on creative performance, while participants scoring low on pre-TDT experienced a facilitative effect of reward.

4. Discussion

4.1 Summary of results

The results of the regression analysis and the following simple slopes analyses revealed some interesting effects of reward on creative performance. The effect of reward differed depending on the creative potential of the participants. For participants scoring 2 standard deviations above the mean on the pre-test (high-participants), the more attractive they found the reward, the less creatively they performed on the post-test. This effect was reversed for the participants scoring 2 standard deviations below the mean on the pre-test (low-participants). For these latter participants, the more attractive they found the reward, the

more creatively they performed on the post-test. Moreover, when keeping the pre-test score constant at the mean, the attractiveness of the reward did not affect the participants' level of creativeness on the post-test. These results confirm our main-hypothesis that the effect of reward depends on the degree to which an individual is in a creativity-conducive mental state, and accordingly, the relationship between reward and creative behavior can not be explained by simple main-effects alone. The present findings may have some implications regarding the learned industriousness theory (Eisenberger & Selbst, 1994) and the intrinsic motivation principle of creativity (Amabile, 1996).

4.2 The results seen in relation to the learned industriousness theory

The learned industriousness theory claims that individuals extend more effort to dimensions of behavior which they expect will be rewarded. If no clues are given as to which dimensions of behavior are rewarded, individuals will generalize from earlier experiences, and perform either creatively or conventionally, according to their experiences as to what kind of behavior is normally rewarded (Eisenberger & Selbst, 1994).

In order for the learned industriousness theory to account for the results found in the present study, the participants would have had to expect differently as to whether creative or conventional behavior would be rewarded. Since the high-participants had a detrimental effect of reward on creativity, they must have expected conventional behavior to be rewarded. The low-participants, who experienced a facilitative effect of reward, must have expected creative behavior to be rewarded. However, this seems like an anti-intuitive conclusion. In fact, *if* the participants possessed differing expectations regarding what type of behavior would be rewarded, it would be more logical to conclude that the high-participants were more tuned to creative performance compared to the low-participants, and that they therefore would be more prone to perceive the reward promised on the subsequent task to be dependent on creative performance instead of conventional performance, compared to the low-participants.

The present study was designed to make the participants respond in a creative manner, without explicitly stating that creative responses were preferred. The participants were asked to comment on a situation they had never experienced before. Kaufmann (2006) argue that novelty-tasks like this one, represent a "…cue that a novel solution is required" (p. 246). Hence it was expected that the participants would assume creative responses to be preferred over conventional responses. If all the participants *did* expect creative responses to be

preferred, the reward would have a facilitative effect on response-creativity. On the other hand, if the participants were not cued toward assuming that creative responses were preferred, they would, according to Eisenberger and Selbst (1994), generalize from earlier experience that normally conventional responses are rewarded, and accordingly assume that conventional responses were preferred. In this latter case, the reward would have a detrimental effect on response-creativity.

Regardless, whether or not the participants expected creative or conventional behavior to be rewarded, the learned industriousness theory can not account for all of the results found in the present study. The most reasonable assumption would be that the participants expected creative responses to be rewarded, and thus the learned industriousness theory can account for the results pertaining to the low-participants, but not the results concerning the high-participants.

4.3 The results seen in relation to the intrinsic motivation principle of creativity

The current findings also present some challenges regarding the intrinsic motivation principle of creativity. According to this principle, a reward is detrimental to creativity to the degree that it is perceived as controlling. In contrast, a reward perceived as enabling or informational can have a facilitative effect on creativity (Amabile, 1996). In addition, a reward being perceived as a bonus, instead of as being contingent on task-performance can also be conducive to creativity (Amabile, Goldberg & Capotosto, as cited in Amabile, 1996).

As mentioned above, in the study of Amabile, Phillips and Collins (as cited in Amabile, 1996), commissioned and non-commissioned works of art were judged on creativity by art experts. Regarding the commissioned art, a positive correlation was found between creativity and the degree to which the artists found the commission enabling, or informational about competence. To the degree that the commissions created a platform (economic freedom) for the artists to actually perform their art, and revealed information that the public valued their work, it is conceivable that the commissions can have had a facilitative effect on creativity. In comparison, the reward employed in the present study can neither be said to have enabled the participants to perform creatively, nor to have revealed any information about competence. Furthermore, the reward is unlikely to have been perceived as a bonus. Since it was not offered to all the participants simply for participating, but was promised to the top five performers exclusively, it is more likely to have been perceived as a controlling

extrinsic motivator, offered to make the participants perform at their best. Thus, the reward offered in the present study should have a detrimental effect on creativity, according to the intrinsic motivation principle of creativity.

The high- and low-participants in the present study must have perceived the reward differently, in order for the intrinsic motivation principle of creativity to account for the results. The high-participants must have perceived the reward as a controlling extrinsic motivator, and the low-participants must somehow have experienced the reward as enabling, informational about competence, or as a bonus. However there is no reason to assume that the high- and low-participants should perceive the reward differently. As argued above, the most reasonable conclusion is that all the participants perceived the reward as a controlling extrinsic motivator. Hence, the intrinsic motivation principle of creativity can only account for the results pertaining to the high-participants.

Following the arguments of the theorists claiming that a defocused attention and associative thought is conducive to creative idea-generation (see Martindale, 1999), Amabile (1996) argue that such a creativity-conducive mental state (creative potential) is more typical of intrinsically motivated individuals compared to extrinsically motivated individuals. It is further theorized that a controlling extrinsic motivator will narrow the attention of the individual, and thus have a detrimental effect on creativity. On this ground it was hypothesized that the higher creative potential an individual has, the more detrimental the effect of a reward should be on the creativity of that individual. Further, the effect of a reward on creativity might even become positive if the creative potential of the individual was very small. Regarding the results of the present study, some support for this hypothesis has been found.

4.4 The missing main-effect of reward

The reason why neither a facilitative nor a detrimental main-effect of reward was found, as would be expected from the learned industriousness theory and the intrinsic motivation principle of creativity, respectively, might be attributed to the operationalization of reward employed in the present study. Since a reward was only offered to the top five performers, some participants might have felt that the reward was out of reach, and were therefore to a lesser degree affected by it, than they would have been if they really thought that they had a good chance of obtaining the reward. Even though it was never stated how

many participants there were in total in the study, and there were a maximum of 15 people participating at a single instance, several of the participants might have had a certain understanding of how many participants are normally present in psychological studies (all participants were first year psychology students, and many of them were at the time undertaking a course in methods), and accordingly considered the chances of winning as small.

In addition, psychology students may be less naïve compared to other participants. They may possess some knowledge about the use of deception in psychological experiments, and therefore they might be less prone to be influenced by the manipulation employed in the present study.

4.5 Conclusion

The present study sought to investigate whether creative potential (creativity-conducive mental state) is a factor mediating the effect of reward on creative performance. The results indicate that creative potential has the ability to integrate the seemingly contradictory theories of the intrinsic motivation principle of creativity and the learned industriousness theory, where the first claims that reward has a detrimental effect on creative performance, while the latter maintains that the achieved effect is in fact facilitative. Regarding the results of the present study, the intrinsic motivation principle explains the detrimental effect of reward on creative performance in the case of the high-performing participants, while the learned industriousness theory explains the facilitative effect of reward in the case of the low-performing participants.

The present results show how important it is to take individual differences into account when considering the degree to which one ought to encourage people to perform creatively. A suggestion for future research might be to replicate the present study using a larger N, in order to make more certain conclusions. It might also be considered to further investigate the interaction-effect found in the present study, employing a stronger manipulation.

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6. Appendixes

Appendix I

A

Du vil nå bli gitt en usannsynlig situasjon- en som sannsynligvis aldri vil finne sted. Du må ganske enkelt *forestille deg* at det har skjedd. Dette vil gi deg muligheten til å bruke fantasien din til å forestille deg alle de andre spennende tingene som ville skje HVIS denne usannsynlige situasjonen skulle finne sted.

Bruk fantasien, og *forestill deg* at situasjonen som blir beskrevet hadde skjedd. SÅ, tenk deg alle de andre tingene som ville skje som en følge av dette. Med andre ord, hva ville bli konsekvensene? Gjør så mange gjetninger som du klarer.

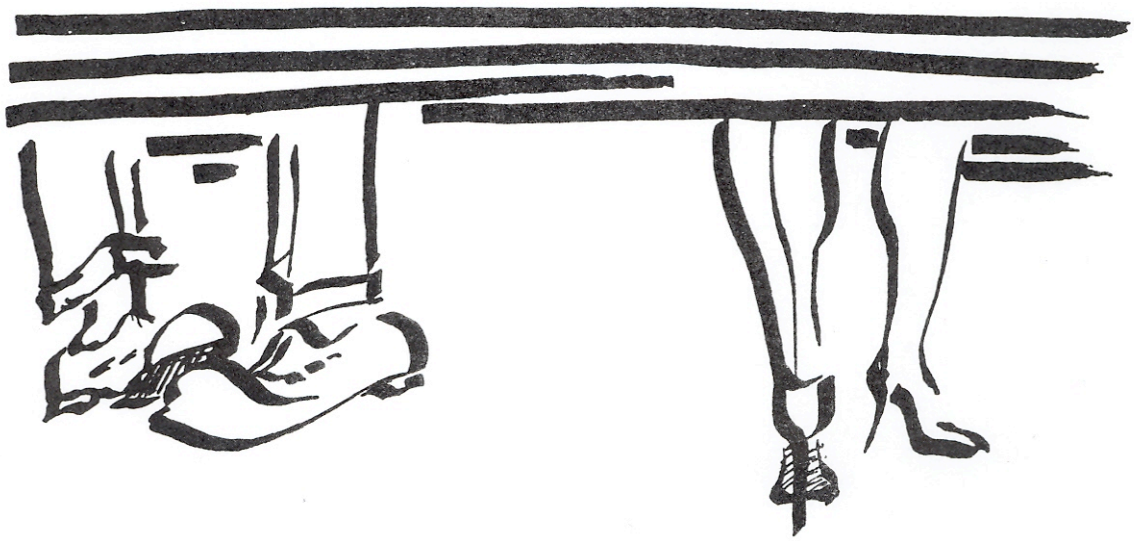
Den usannsynlige situasjonen - FORESTILL DEG *at skyene hadde tau festet til seg, som hang ned til jorden.* Hva ville skje? Lag en liste over ideer og gjetninger på neste side.

B

Du vil nå bli gitt en usannsynlig situasjon- en som sannsynligvis aldri vil finne sted. Du må ganske enkelt *forestille deg* at det har skjedd. Dette vil gi deg muligheten til å bruke fantasien din til å forestille deg alle de andre spennende tingene som ville skje HVIS denne usannsynlige situasjonen skulle finne sted.

Bruk fantasien, og *forestill deg* at situasjonen som blir beskrevet hadde skjedd. SÅ, tenk deg alle de andre tingene som ville skje som en følge av dette. Med andre ord, hva ville bli konsekvensene? Gjør så mange gjetninger som du klarer.

Den usannsynlige situasjonen - FORESTILL DEG *at en massiv tåke senket seg over jorden slik at alt vi kunne se av andre mennesker var føttene deres.* Hva ville skje? Hvordan ville dette forandre livet på jorden? Lag en liste over ideer og gjetninger på neste side.



Appendix II

Når det gjelder premien (**gavekort på Platekompaniet**) i forbindelse med oppgave 2.

Svar på spørsmålene ved å krysse av på et punkt på de medfølgende skalaene:

1. I hvilken grad finner du premien attraktiv?

1	2	3	4	5	6	7
I veldig liten grad			Noe			I veldig stor grad

2. Hvor glad ville du blitt hvis du hadde fått denne premien i bursdagsgave?

1	2	3	4	5	6	7
Ikke glad			Noe glad			Veldig glad

3. Hvor mye ønsker du denne premien?

1	2	3	4	5	6	7
I veldig liten grad			Noe			I veldig stor grad